NATURAL CHANGE IN SIZE OF INTERNAL DEFECTS IN THE CASE OF TURKEY OAK (*QUERCUS CERRIS*) ROUND LUMBER SAMPLES, HIGHLIGHTED IN THE FOREST "BOBOŞTEA" (BIHOR COUNTY))

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Abstract

This paper aims to conduct research on the quality of wood in the case of a certain forest species (i.e. Turkey Oak or Quercus Cerris), and the variation on terms of quality under the influence of different factors, provided also the conditions within its spreading area in our country.

When compared to standing trees, round pieces of raw wood (logs) provide additional information given the possibility to visualize their internal structure, emerged on their cross-sections at the tree ends; a special attention will be paid to foot log (standing timber), namely to the first round wood piece at trunk bottom, incorporating the highest quality wood of the whole tree and encompassing a significant share of its volume.

After sectioning of a number of three Turkey Oak trees, a total of 30 pieces (samples) of Turkey Oak raw round wood resulted which were subject to research in order to identify and quantify their main natural internal defects.

Key words: internal natural defects, raw round wood, Turkey Oak (*Quercus Cerris*), Forest "Boboştea"

INTRODUCTION

Structure and quality of Turkey Oak (*Quercus Cerris*) wood subjected to research in the surveyed area can be analyzed by considering a large number of research possibilities, due to the complexity of factors involved in research (Bartha Sz., 2011; Bartha Sz., 2012).

Wood subject to logging includes a number of size and quality categories, both in relation to the original structure (standing timber), and to the transformations underwent during technological operations (Oprea I., Sbera I., 2004). Their classification into categories (by size, quality, usage areas), according to current standards in order to market the wood is achieved by sorting (Beldeanu E.C, 1999; 2008).

Timber sorting represents a technical and economic analysis carried out for the purposes of classifying timber by raw wood assortments, but also the technological operation involved in obtaining the former (Beldeanu E.C, 2005; 2008).

By wood assortment one means a piece of wood or a wood product resulted from the forest logging activity, corresponding in terms of species,

condition, size and quality to the requirements imposed for its area of use (Ciubotaru A., 1998).

Over time, Turkey Oak (*Quercus Cerris*) has been considered in our country a controversial species because of the totally different assessments results regarding some physical, mechanical and technological properties of this wood. Some negative remarks such as: a large number of defects (frost-cracks, shakes, a strong tendency to crack, the different colour of its core part, etc.), wide sapwood, low durability (especially when in contact with the ground) have been large shortcomings preventing intensification and broadening the area of use of Turkey Oak wood (Ghelmeziu 1963, quoted by Adam, 2004).

Currently, in our country, Turkey Oak (*Quercus Cerris*) wood finds its use in different areas (according to Romanian standards in force), such as: timber for industrial use; wood for wooden boards made of wood chips and wood fibber boards; building timber; wood for charcoal and fuel; sleepers (***, 11; ***,12; ***, 13; ***, 14; ***, 15).

MATERIAL AND METHOD

The statistical pool subject to research comprises three felled trees (Forest Boboştea-Bihor county) plot 87D (Compartment VII Boboştea-Forest District Sfânta Maria), (***, 1997a; ***, 1997b; Bartha Sz., Pantea S., 2014), from which a total of 30 pieces of Turkey Oak raw round wood resulted.

Felled trees were cut as follows: the first piece (sample) to one meter long and the remaining pieces (samples) to two meters long, up to reaching the first green branch, thereby achieving a total of 10 pieces cut per tree (Fig. 1).

Identifying and quantifying natural internal defects on Turkey Oak (*Quercus Cerris*) raw wood pieces was done by examining each cross cut section (at both the butt end and top end), and one studied the defects' nature, frequency, location and severity, the distance between defects not permitted in the case of round wood assortments.

For every tree felled, a description card was elaborated, encompassing the following items: origin, total height, tree pruned height, butt diameter, number of pieces (samples) of raw round wood resulted, and the nature and quantifying of internal natural defects, on each piece (sample) thus obtained (Tables 1, 2 and 3).

Desktop research consisted in processing and interpretation of data collected in the field, and the mathematical processing of the data was performed in Excel.

Fig. 1. Turkey Oak raw round wood
(Plot 87D, Compartment VII Boboştea, Forest District Sfânta Maria)

Table 1

Description card for the raw round wood pieces resulted from the tree no.1

Tree no.1	**Source** - sprout	**H_{total}** = 29 m	**H_{pruned}** = 19 m	**$D_{1.3}$** = 42 cm
No. pieces of round wood resulted = 10				
Piece no.1 (lenght = **1 m**)	**Internal defects**			
	Star shake at tree butt, 5 cracks		-	
Piece no.2 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (12 cm depth)		Closed frost crack at the top end (13 cm depth)	
Piece no.3 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (12.5 cm depth)		Closed frost crack at the top end (13 cm depth)	
Piece no.4 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (11 cm depth)		Closed frost crack at the top end (11 cm depth)	
Piece no.5 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (9 cm depth)		-	
Piece no.6 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the top end (13 cm depth)		-	
Piece no.7 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (13.5 cm depth)		-	
Piece no.8 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.9 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.10 (lenght = **2 m**)	**Internal defects**			
	-		-	

Table 2

Description card for the raw round wood pieces resulted from the tree no.2

Tree no.2	**Source** - sprout	**H_{total}** = 28 m	**H_{pruned}** = 19 m	**$D_{1.3}$** = 46 cm
No. pieces of round wood resulted = 10				
Piece no.1 (lenght = **1 m**)	**Internal defects**			
	Closed frost crack at the butt end (12 cm depth)		-	
Piece no.2 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (11 cm depth)		Closed frost crack at the top end (16 cm depth)	Eccentricity (butt end) = 13%
Piece no.3 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.4 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (12 cm depth)		Closed frost crack at the top end (10 cm depth)	
Piece no.5 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (9 cm depth)		Closed frost crack at the top end (11 cm depth)	
Piece no.6 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (11 cm depth)		Closed frost crack at the top end (11 cm depth)	
Piece no.7 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.8 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.9 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.10 (lenght = **2 m**)	**Internal defects**			
	-		-	

Table 3

Description card for the raw round wood pieces resulted from the tree no.3

Tree no.3	**Source** - sprout	**H_{total}** = 29 m	**H_{pruned}** = 21 m	**$D_{1.3}$** = 46 cm
No. pieces of round wood resulted = 10				
Piece no.1 (lenght = **1 m**)	**Internal defects**			
	3 closed frost cracks at the top end (8, 11, 13 cm depth)		Internal rot at the butt end = 12 %	Eccentricity (top end) = 41 %
Piece no.2 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (13 cm depth)		Closed frost crack at the top end (13 cm depth)	
Piece no.3 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (12 cm depth)		Closed frost crack at the top end (12 cm depth)	
Piece no.4 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the top end (10 cm depth)		-	
Piece no.5 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (11 cm depth)		-	
Piece no.6 (lenght = **2 m**)	**Internal defects**			
	Internal rot at the top end = 66 %		-	
Piece no.7 (lenght = **2 m**)	**Internal defects**			
	Closed frost crack at the butt end (11 cm depth)		Internal rot at the butt end = 60 %	
Piece no.8 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.9 (lenght = **2 m**)	**Internal defects**			
	-		-	
Piece no.10 (lenght = **2 m**)	**Internal defects**			
	-		-	

RESULTS AND DISCUSSION

Following the analysis of raw data collected and quantified by class of defects for each piece of raw round Turkey Oak wood, one may draw the following conclusions:

As for the raw round wood pieces resulted from the tree no. 1 (Table 1):

- 6/10 (60%) of the pieces surveyed are affected by closed frost cracks, either at the butt end (5), or at the top end (4);
- Considering a class range in terms of depth of frost cracks across the round wood (where: Class I < 5 cm, Class II = 6-10 cm, and Class III = 11 to 20 cm), Class III frost cracks are predominant (8 frost cracks per class), followed by a single Class II frost crack;
- Out of the total number of 6 pieces affected by closed frost cracks (both at the butt end, an at the top end), an average of 1.5 closed frost cracks /affected piece resulted (i.e. 9 frost cracks/6 pieces);
- Other natural internal defect which is visible on the cross section of the pieces surveyed is the star shake showing 5 cracks which occurred at the bottom of the tree log;
- Pieces 8, 9, and 10 show no internal defects.

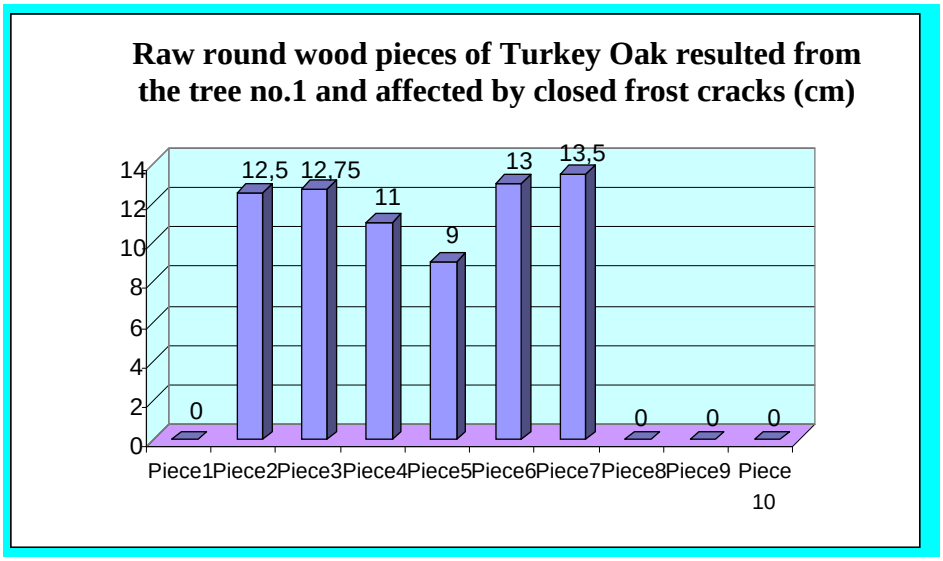

Fig. 2. Raw round wood pieces of Turkey Oak resulted from the tree no. 1 and affected by closed frost cracks

- Analyzing the chart above, one may notice that the tree no. 1 (felled and cut) is full of closed frost cracks for a length of 13 m (Fig. 2);

As for the pieces of raw round wood resulted from the tree no. 2 (Table 2):

- 5/10 (50%) of the parts analyzed are affected by closed frost cracks either at the butt end (5) or at the top end (4);
- Considering a class range in terms of depth of frost cracks across the round wood (where: Class I < 5 cm, Class II = 6-10 cm, and Class III = 11 to 20 cm), Class III frost cracks are predominant (7 frost cracks per class), followed by two Class II frost cracks;
- Out of the total number of 5 pieces affected by closed frost cracks (at both the butt end and the top end), an average of 1.8 closed frost cracks/affected piece resulted (i.e. 9 frost cracks/5 pieces);
- Other natural internal defect visible on the cross section of the pieces analyzed is the eccentricity of 13%, which appears at the bottom of piece no. 2;
- Pieces no. 3, 7, 8, 9, and 10 show no visible internal defects.

Analyzing the chart below (Fig. 3), it appears that the tree no. 2 (felled and cut) is full of closed frost cracks for a length of 11 m (except the 3 to 5 m section);

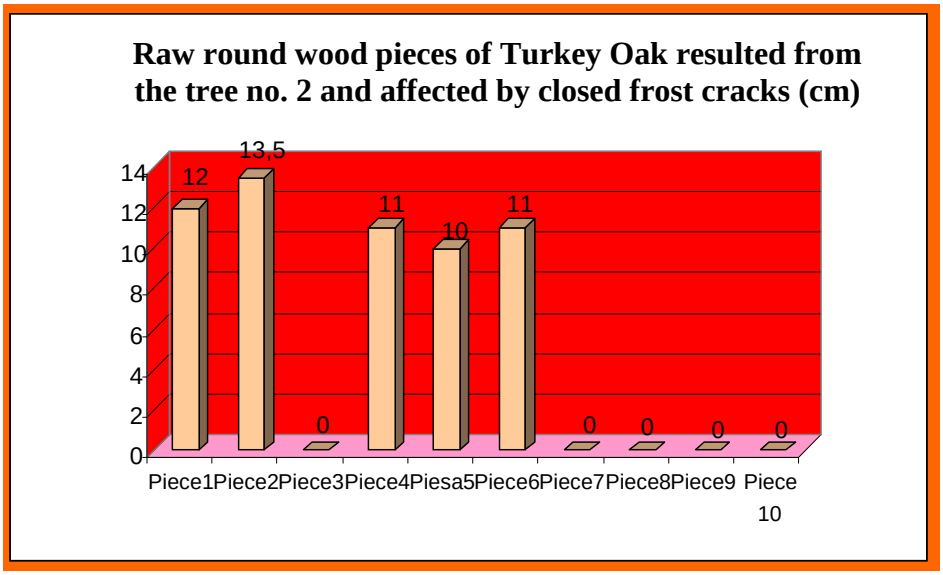

Fig. 3. Raw round wood pieces of Turkey Oak resulted from the tree no. 2 and affected by closed frost cracks

As for the pieces of raw round wood resulted from tree no. 3 (Table 3):

- 6/10 (60%) of the parts analyzed are affected by closed frost cracks closed either at the butt end (4), or at the top end (6);

• Considering a class range in terms of depth of frost cracks across the round wood (where: Class I < 5 cm, Class II = 6-10 cm, and Class III = 11 to 20 cm), Class III frost cracks are predominant (8 frost cracks per class), followed by two Class II frost cracks;

• Out of the total number of 6 pieces affected by frost cracks (at both the butt end and at the top end), an average of 1.66 closed frost cracks/ affected piece resulted (i.e. 10 frost cracks / 6 pieces);

• Other natural internal defects visible on the cross section of the pieces analyzed are internal rot (present on 3 pieces i.e.-1, 6, and 7, at rates of 12%, 66% and 60%, respectively) and the eccentricity, with a rate of 41% which appears at the bottom of piece no. 1);

• Pieces 8, 9 and 10 show no visible internal defects.

Analyzing the chart below (Fig. 4), it appears that the tree no. 3 (felled and cut) is full of closed frost cracks for a length of 11 m.

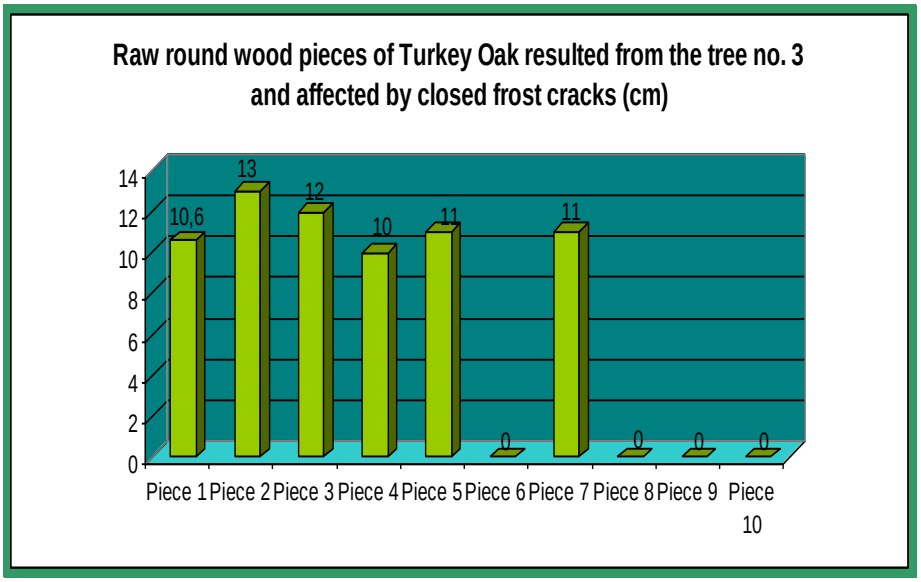

Fig. 4. Raw round wood pieces of Turkey Oak resulted from the tree no. 3 and affected by closed frost cracks

CONCLUSIONS

• Pieces of raw round heaven (30 in total) subject to research in the present case study (on the cross section of wood cut), are affected by a number of 4 natural internal defects (closed frost crack, internal rote, eccentricity and star shake);

• The most common defects in terms of frequency of occurrence, on the pieces analyzed are as follows: closed frost cracks (57%), internal rot (10%), eccentricity (7%) and star shake (3%);

- Out of the total of 28 closed frost cracks occurring on the cross section of 17 pieces of raw round of Turkey Oak, 23 are in the Class III (a length ranging between 11 and 20 cm) and 5 in the Class II (a length ranging between 5-10 cm);
- It is important to follow the quality downgrading taking into consideration only the closed frost cracks because this defect has an impact on 57% of the pieces of raw round Turkey Oak analyzed, with all the negative consequences arising later from the higher subsequent utilization of wood.

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